

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/000994

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: E04H 12/00, E01F 9/013

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPC E04H 12/00, 12/22, 17/20, 17/22 E01F 9/00, 9/011, 9/013 and SOCKET, HOLDER, SLOT CHANNEL, SPIKE, STAKE and the like

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 004 820 B (MORALY) 9 November 1983 Figures	1 - 5
X	US 2 554 887 A (TRICARICO) 29 May 1951 Figures	1 - 17
X	US 4 095 788 A (BENENSON) 20 June 1978 Whole document	1 - 11, 16, 17
X	DE 19523173 A (ERNST BREMICKER GmbH) 2 January 1997 Whole document	1 - 9

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"B" earlier application or patent but published on or after the international filing date

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"O" document referring to an oral disclosure, use, exhibition or other means

"&" document member of the same patent family

"P" document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search
21 September 2004

Date of mailing of the international search report
30 SEP 2004

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 231 363 A (BELDRAY LIMITED) 14 November 1990 Whole document	1 - 10, 16, 17
X	AU 81532/91 A (HART et al) 26 March 1992 Whole document	1 - 5, 8, 9
X	AU 81768/91 A (GUTMANN) 26 March 1992 Whole document	1 - 10, 12 - 14, 16
X	AU 64518/90 B(609373) (BARRATT) 26 April 1991 Whole document	1 - 9, 11 - 14, 16, 17

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Supplemental Box

(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The international application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept. In coming to this conclusion the International Searching Authority has found that there are different inventions as follows:

1. Claim 1. It is considered that a method of installation of a post in the ground which includes the steps of :
(i) forming a hole in the ground; (ii) locating a ground anchor in the hole having one or more internal sockets wherein the or each internal socket is substantially flush with ground level; and (iii) inserting the guide post in the internal socket whereby said post is retained therein with a major part of the post extending above ground level whereby flexing of the post upon impact may occur about a hinge point corresponding with ground level comprises a first "special technical feature".
2. Claim 8. It is considered that a ground anchor for supporting a guide post in the ground having a body and one or more ground penetration members and at least one internal socket for receiving the guide post in use wherein there is provided retaining means for retaining the guide post within said at least one internal socket in us wherein said retaining means is located adjacent said at least one internal socket for effecting release of the guide post from said at least one internal socket when required comprises a second special technical feature.

Since the abovementioned groups of claims do not share any of the technical features identified, a "technical relationship" between the inventions, as defined in PCT rule 13.2 does not exist. Accordingly the international application does not relate to one invention or to a single inventive concept, a priori.

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
EP	4820	NONE	
US	2554887	NONE	
AU	64518/90	NONE	
AU	81768/91	NONE	
AU	81532/91	NONE	
GB	2231363	NONE	
DE	19523173	NONE	
US	4095788	AU	25417/77 JP 53128429
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.			
END OF ANNEX			

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)
(PCT Article 36 and Rule 70)

REC'D 30 AUG 2005

WIPO PCT

Applicant's or agent's file reference 13094PC2	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/AU2004/000994	International filing date (day/month/year) 23 July 2004	Priority date (day/month/year) 23 July 2003
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ E04H 12/00, E01F 9/013		
Applicant SIDC Pty Ltd.		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
 - a. ☒ (sent to the applicant and to the International Bureau) a total of 8 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 11 November 2004	Date of completion of the report 15 August 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer VENKAT IYER Telephone No. (02) 6283 2144

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/000994

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1 (b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1, 6 - 9 as originally filed/furnished

pages* 2, 3 received by this Authority on 11 November 2004 with the letter of 12 May 2005

pages* 4, 5, 5a received by this Authority on 30 June 2005 with the letter of 30 June 2005

☒ the claims:

pages as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* 10 - 12 received by this Authority on 11 November 2004 with the letter of 12 May 2005

pages* received by this Authority on with the letter of

☒ the drawings:

pages 1 - 12 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITYInternational application No.
PCT/AU2004/000994**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1 - 16	YES
	Claims	NO
Inventive step (IS)	Claims 1 - 16	YES
	Claims	NO
Industrial applicability (IA)	Claims 1 - 16	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)**NOVELTY and INVENTIVE STEP:**

D1: EP 0 004 820 D2: DE 19523173 D3: US 2 554 887
D4: AU 81532/91 D5: US 4 095 788 D6: GB 2 231 363
D7: AU 81768/91 D8: AU 64518/90

None of the above citations disclose or suggest either individually or in combination the method of installation of a flexible post in the ground using a ground anchor as specified or the ground anchor having the features now defined in the claims.

The claims are considered to be novel and to involve an inventive step.

INDUSTRIAL APPLICABILITY:

The claims are industrially applicable.

replacement.

In another conventional arrangement a steel anchor is used having a pointed end which is driven into the ground which supports an upwardly extending post which is riveted to a plate like top part of the anchor. Again
5 the anchor extended above the ground and was likely to be damage by impact which therefore required total replacement.

Reference also may be made to replaceable guideposts or traffic posts which are disclosed in US Patent 6,461,084 which refers to a ground anchor having fins which are embedded in the ground and a post receiving
10 portion in the form of deflectable collets that are clamped against a post by a clamping member. A damaged post can be replaced by removing the clamping member, replacing the post and reattaching the clamping member. However the ground anchor had an elongate part at an upper end thereof which extended above the ground and thus was liable to be impacted during
15 a traffic collision which destroyed the ground anchor which thereby needed replacement.

Similar replaceable guideposts are described in GB 2,217,357, US 3,342,444, US 4,235,034, US 5,123,623, WO 96/23118, US 4,455,795, GB 2,346,854, DE 20211831, US 3,182,936, US 2,554,887, EP 0 004820 and
20 WO 01/31145 all of which suffered from the same disadvantage as described above, i.e. having a ground anchor with a part extending above the ground for receiving a post which was liable to be impacted by a passing vehicle which therefore necessitated entire replacement of the ground anchor which was time consuming and expensive.

25 It is therefore an object of the invention to provide a ground anchor and a method of installation which therefore may alleviate the abovementioned disadvantage of the prior art.

The invention in one aspect provides a method of installation of a flexible post in the ground, said flexible post being of plate like configuration
30 having a pair of opposed broad surfaces and a pair of edges which are restricted or narrow in width which includes the steps of:

- (i) forming a hole in the ground;

- (ii) locating a ground anchor in the hole having one or more internal sockets wherein the or each internal socket is substantially flush with ground level; and
- (iii) inserting the post in the internal sockets whereby said post is retained therein with a major part of the post extending above ground level whereby flexing of the post upon impact due to its plate like configuration may occur about a hinge point corresponding to ground level.

In step (i) the hole may be formed by an excavating tool such as a spade or use of a suitable driving tool or alternatively may be formed by hammering the ground anchor into the ground until the ground anchor is substantially flush with the ground. This is suitable when the ground is relatively soft.

It therefore will be appreciated from the foregoing that steps (i) and (ii) can be carried out sequentially or simultaneously.

In relation to step (iii) the post may be retained within the internal socket of the ground anchor by interference fit or alternatively by use of a latch or projection engaging an aperture in the ground anchor or the post. Preferably use is made of a latch of the post engaging a mating aperture of the ground anchor.

In another aspect of the invention there is provided a ground anchor said ground anchor having a body and one or more ground penetration members and at least one internal socket for receiving the guide post in use, said at least one internal socket being (i) of corresponding shape to the flexible post or (ii) having a pair of opposed grooves for engagement with corresponding edges of the flexible post wherein there is provided retaining means for retaining the guide post within said at least one internal socket in use wherein said retaining means is located adjacent said at least one internal socket for effecting release of the guide post from said at least one internal socket when required.

The internal socket of the body of the ground anchor may be elongate and thus may have a cross sectional shape in the form of a shallow rectangle

wherein one pair of opposed surfaces of the rectangle have a much greater width than another pair of opposed surfaces of the rectangle. In another and more preferred arrangement the socket may be in the shape of a shallow channel corresponding to a V, U or C wherein the socket has a pair of
5 opposed surfaces of shallow corresponding curvature which are of far greater width than another pair of opposed surfaces which are relatively narrow in width in comparison.

This embodiment is particularly useful because the posts to which the ground anchor of the invention are particularly directed have a corresponding
10 shape to the internal socket.

However it is within the scope of the invention as described in the preferred embodiment hereinafter that the body of the ground anchor comprise a pair of spikes separated by a spacer plate wherein each spike is provided with a socket or groove of channel configuration whereby edges or
15 flanges of the post having a similar cross sectional shape may engage with and move or slide within a corresponding socket or groove.

The retaining means of the ground anchor may comprise a slot or aperture in a side wall of the body which in use may engage with a latch or projection of the post to retain the post within the internal socket of the
20 ground anchor. Alternatively the retaining means may comprise a latch or projection of the body engaging with a corresponding slot or aperture of the post.

The body may also have at least one ground penetrating member or a pair of ground penetrating members. In one form the ground penetration member may comprise a sharpened bottom edge portion of the body
25 preferably having a wedge type configuration. In another form the ground penetration member(s) may comprise one or more ground penetration spikes extending downwardly and outwardly from the body in use.

Reference may now be made to a preferred embodiment of the invention as shown in the attached drawings wherein:
30

FIG 1 is an exploded perspective view of the ground anchor of the invention in the appropriate orientation to engage with a mating post;

FIG 2 is a similar view to FIG 1 wherein the ground anchor is provided with a different retaining means to that shown in FIG 1;

FIG 3 shows a similar view to FIG 1 showing the use of a screwdriver or other tool to release the post from the ground anchor;

5 FIG 4 is a perspective view of a driving tool for forming a hole in the ground before insertion of the ground anchor as shown in FIG 1;

FIG 5 is a perspective view of the ground anchor of FIG 1 associated with another driving tool for driving the ground anchor into the ground;

10 FIGS 6-7 show different perspective views of another ground anchor of the invention in the appropriate orientation to receive an associated post;

FIG 8 shows a perspective view of another form of ground anchor in accordance with the invention in the appropriate orientation to receive an associated post;

15 FIG 8A shows the device of FIG 8 being impacted by a mallet to penetrate the ground;

FIG 9 shows various forms of indicator means attached to the post which extends upwardly from the ground anchor as shown in FIG 1;

FIG 10 shows the post supported by a ground anchor of the invention springing back to an upright orientation after being impacted;

20 FIGS 11, 12 and 13 show views of the sequential steps of the method of the invention;

FIG 14 shows a post supported by a ground anchor of the invention having a ramp device associated therewith to lessen the force of an impact and showing the post springing back to the upright orientation after impact;
25 and

FIGS 15-16 show a perspective view and a side view of the ground anchor of the invention having a peripheral rounded lip adjacent an open end of the internal socket; and

5a

FIG 17 shows an exploded perspective view of another ground anchor device of the invention; and

5 FIG 18 shows a cross sectional view showing how a cover strip of the ground anchor is attached to the body of the ground anchor.

10 In FIG 1 there is shown ground anchor 10 of the invention having body 11 which has a pair of ground penetrating spikes 12. Each spike 12 is provided with reinforcement ribs 13. The body 11 is also provided with reinforcement ribs 14 and 15 on each side of an internal socket 16 having an open end 17. Ribs 14 and 15 also have pointed ends 14A and 15A. There is

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of installation of a flexible post in the ground, said flexible post being of plate like configuration having a pair of opposed broad surfaces and a pair of edges which are restricted or narrow in width which includes the steps of:
- 5 (i) forming a hole in the ground;
- (ii) locating a ground anchor in the hole having one or more internal sockets wherein the or each internal socket is substantially flush with ground level; and
- 10 (iii) inserting the post in the internal sockets whereby said post is retained therein with a major part of the post extending above ground level whereby flexing of the post upon impact due to its plate like configuration may occur about a hinge point corresponding with ground level.
2. A method as claimed in claim 1 wherein in step (i) the hole is excavated prior to location of the ground anchor in the hole.
- 15 3. A method as claimed in claim 1 wherein the hole is formed simultaneously with driving the ground anchor into the ground.
4. A method as claimed in any preceding claim wherein the post is retained within a single internal socket of the ground anchor whereby the cross sectional shape of the post corresponds to the shape of the single internal socket.
- 20 5. A method as claimed in any preceding claim wherein the post is retained with said internal socket(s) by interference fit.
6. A method as claimed in any preceding claim wherein the post is securely retained within the internal socket(s) by one or more latch projections of the post or ground anchor engaging with corresponding aperture of the ground anchor or post.
- 25 7. A method as claimed in claim 6 wherein said latch projections are disengaged from said corresponding apertures to thereby release the post from engagement with the ground anchor.
- 30 8. A ground anchor for supporting a flexible post of plate like configuration having a pair of opposed broad surfaces and a pair of edges, in

the ground said ground anchor having a body and one or more ground penetration members and at least one internal socket for receiving the guide post in use, said at least one internal socket being (i) of corresponding shape to the flexible post or (ii) having a pair of opposed grooves for engagement with corresponding edges of the flexible post wherein there is provided retaining means for retaining the guide post within said at least one internal socket in use wherein said retaining means is located adjacent said at least one internal socket for effecting release of the guide post from said at least one internal socket when required.

9. A ground anchor as claimed in claim 8 having a single internal socket which has a cross sectional shape which corresponds to a cross sectional shape of the post.

10. A ground anchor as claimed in claim 9 wherein said retaining means includes one or more latch projections of the body extending into said internal socket for engagement with corresponding aperture(s) of the post in use.

11. A ground anchor as claimed in claim 9 wherein the retaining means includes one or more latch apertures in the body for engagement with corresponding latch projections of the post in use.

12. A ground anchor as claimed in claim 10 or 11 wherein either of said latch projections or said latch apertures are engageable or have an adjacent surface of the body contactable by a tool to effect release of the retaining means to facilitate removal of the post from the ground anchor.

13. A ground anchor as claimed in claim 12 wherein the latch projection is contactable by said tool.

14. A ground anchor as claimed in claim 12 wherein there is provided a cover strip having said latch projections engageable with said body and said cover strip is contactable by said tool.

15. A ground anchor as claimed in any one of claims 8-14 wherein the ground penetration members comprise a plurality of spikes which extend downwardly from a bottom end of said at least one socket.

16. A post-ground anchor assembly which includes the ground anchor of

any one of claims 8-15 and a post retained within said at least one internal socket with said retaining means including one or more latch projections of the ground anchor or post engaging with corresponding latch apertures of the post or ground anchor.